1092-68 Prediction for Obstructive Coronary Artery Evaluated Coronary Artery Calcification by Electron Beam Computed Tomographic Scanning

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It was described that the absence of coronary artery calcification detected by electron beam computed tomography (EBCT) was highly predictive of the pathological absence of obstructive coronary artery disease. This study was the first to show clinical prediction of the obstructive coronary arteries evaluated by coronary artery calcification using EBCT, vessel by vessel. *Methods:* One-hundred and twenty patients (age 61.6 ± 12.1, 69 male 51 female) who underwent coronary angiography were scanned by EBCT (Imatron-150C). Thirty contiguous, 3-mm thick slices were obtained from the base of the heart to the apex. A calcified lesion was identified as a lesion with a density > 130 HU. A calcium deposit area (CA) of each coronary artery (RCA, LAD, LCX) was determined by adding up for all slices. An obstructive vessel was defined as ≥ 50% stenosis using quantitative coronary angiography. *Results:* (1) The median level of CA (mm^2) in obstructive vessel was significantly higher than that in non-obstructive one in each artery (RCA; 57.5 (n = 25) vs. 0.8 (n = 95), $p < 0.001$, LAD; 62.4 (n = 49) vs. 1.6 (n = 81), $p < 0.001$, LCX; 26.7 (n = 26) vs. 0.0 (n = 94), $p < 0.001$). (2) Only 3 obstructive vessels without calcium deposit by EBCT were exist in RCA and one vessel in LAD. (3) When cut-off levels were set at 7.0 (mm^2) in RCA, 19.0 in LAD, and 8.0 in LCX, the sensitivity, specificity and negative predictive value were 76%, 71%, 92% in RCA, 87%, 67%, 91% in LAD, and 84%, 77%, 94% in LCX, respectively. *Conclusion:* The absence of coronary calcification is highly specific for the absence of obstructive lesion. Evaluation of coronary artery calcification, vessel by vessel, using EBCT is useful for the detection of obstructive coronary arteries.

1092-69 Non-Invasive Coronary Angiography by Electron Beam Tomography After Myocardial Infarction

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Electron beam tomography (EBT, "ultrafast CT") has been shown to permit non-invasive coronary angiography after intravenous injection of contrast agent. We investigated the applicability of the method to assess the coronary arteries in patients after acute myocardial infarction. 14 patients (13 male, 1 female, mean age 52 years) were investigated by EBT after a mean interval of 18 days following acute myocardial infarction (AMI). 40 cross-sections of the heart were obtained triggered to the ECG in breathhold, subsequent 3-D reconstructions were evaluated as to the presence of high-grade stenoses or occlusions of the coronary vessels. The results were compared to conventional coronary angiography in a blinded fashion. In 1 patient, the EBT reconstructions could not be evaluated due to extensive calcifications of all coronary vessels. In 6/13 remaining patients, the culprit vessel was shown to be occluded by invasive angiography, this had been correctly predicted by EBT in 5 cases. In 1 case, a high-grade stenosis of the right coronary artery had been erroneously diagnosed due to filling of the distal vessel via collaterals. In 7/13 patients, the culprit vessel had a high-grade stenosis which was visualized in 5 cases by EBT. In 2 cases, both concerning the left circumflex coronary artery, reduced image quality prevented visualization of the stenosis. 3 high grade stenoses and one coronary artery occlusion not related to the AMI were correctly identified by EBT. Except for one false-positive stenosis, EBT correctly ruled out significant lesions in all remaining coronary vessels. EBT permits the non-invasive assessment of the coronary arteries following acute myocardial infarction. Reduced image quality impairs the judgement of the left circumflex coronary artery.

1092-70 Non-Invasive Assessment of Coronary Stents by Electron Beam Tomography (EBT)

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Coronary stents are implanted in an increasing number of pts.. After implantation, visualization of the stents, particularly of stainless steel stents, is often impossible by coronary angiography (angio) or fluoroscopy. The purpose of this study was to determine localization, length, diameter and patency of the stents non-invasively by EBT. We have studied 95 pts. (84 m, 11 f; 60.1 ± 9.5 yrs.) with 178 stents (Palmaz-Schatz-, Mikro-, NIR- and Wiktor-Stents) in 106 vessels. EBT was performed on an Evolution Scanner (Siemens, 8 mm slice thickness, 50 ms acquisition time, 8 levels) after stent implantation (n = 65) or before recatheterization after 6 months (n = 30). Patency was analysed after i.v. injection of contrast medium (CM, 70–120 ml Ultravist 370) by cineloop-analysis (CLA) and time-density-analysis (TDA). Patency was confirmed if CM was detected distally to the stent both by CLA and TDA. All stents could be clearly identified and distinguished from adjacent calcium deposits. Lengths and diameters could be measured in all pts.. CLA and TDA were feasible in 90% and 63%. Recatheterization showed a stent-stenosis in 15 pts. (50%):

Sensitivity	Specificity	PPV	NPV
80%	60%	67%	75%

Detection of a Stent-Stenosis by EBT, n = 30, P/NPV: pos./neg. predictive value

Conclusion: In contrast to coronary angiography, EBT allows exact localization and sizing of intracoronary stents. Furthermore, with additional application of CM it is a very promising technique to assess stent patency non-invasively.

1092-71 Spiral Computer Tomography (S-CT): A Novel Diagnostic Approach for the Detection of Stenosis of the Extracranial Cerebral Arteries

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For the detection of atherosclerotic lesions of the extracranial cerebral arteries duplex-ultrasounds is an established operator-dependent method, whereas arteriography, still considered the gold standard examination, is associated with a non irrelevant risk of embolic complication. Aim of this preliminary prospective study was to compare the results obtained by S-CT in 44 patients (pts) with the clinical suspicion of an obstructive lesion of the carotid arteries (28 transient ischemic attacks, 11 strokes, 5 carotid bruits). S-CT was performed using volumetric acquisition by continous tube rotation and simultaneous table movement (table-increment 3 mm, -speed 5 mm/s). A total of 7 complete occlusions, 26 severe stenoses (70–99%), 15 mild stenoses (30–69%) and 22 normal or < 20% stenosis were concordantly identified by duplex-US and by S-CT. Comparison of the percentage of stenosis for the two methods was good ($r = 0.87$, $p < 0.01$). Our results indicate that S-CT of the extracranial cerebral arteries is a promising non invasive complementary non-operator dependent examination. Two- and 3-dimensional imaging may add important information for the vascular surgeon on morphology of vascular lesions and adjacent structures.

1093 Echocardiography: In Vitro Studies/Left Ventricular Function

Wednesday, March 19, 1997, 3:00 p.m.–5:00 p.m.
Anaheim Convention Center, Hall E
Presentation Hour: 3:00 p.m.–4:00 p.m.

1093-51 Amplitudes and Durations of Propagated Mitral Flow Waves are Related to Left Ventricular Diastolic Properties: In Vitro Findings

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There has been increasing recognition that mitral flow wave propagation inside the LV is related to LV diastolic properties. But the factors influencing the amplitudes and durations of these propagated flow waves have not been fully elucidated. The hypothesis that these may be related to LV diastolic properties and pressures was tested in an in vitro elastic LV model with pulsatile monophasic passive transmitral flow. Twentynine sets of experiments were conducted with a wide range of left atrial pressures (LAP), LV end-diastolic pressure (LVEDP), blood pressure, cardiac output and operative LV stiffness. Absolute and relative (relative to mitral E wave) amplitudes and durations of the propagated diastolic flow wave in the LV outflow tract (E_{OT} wave) were related to LV pressures and operative stiffness.

Results:

Correlation coefficients

	LAP	LVEDP	LV stiffness
E_{OT} wave amplitude	0.86****	0.89****	0.38*
E_{OT} wave duration	−0.25	−0.26	−0.28
E_{OT}/E amplitude ratio	−0.01	−0.14	0.71****
E_{OT}/E duration ratio 0.25	−0.14	0.71****	
E wave propagation velocity	0.45*	0.29	0.93****

*p < 0.05, **p < 0.01, ***p < 0.001, ****p < 0.0001

Conclusions: Results of this in vitro study indicate that LV filling pressures and operative stiffness may be derived with a high degree of accuracy by